Set of Amended Claims

1. A microproportioning system including
   - a reservoir **for the liquid being dosed**,
   - a micro-diaphragm pump the entrance of which is connected to the reservoir,
   - an open-jet proportioner the entrance of which is connected to the exit of the micro-diaphragm pump,
   - a proportioning port connected to the exit of the open-jet proportioner, and
   - a proportioning control which is in an operative communication with the micro-diaphragm pump and the open-jet proportioner.

2. The system according to claim 1 wherein the proportioning control for filling the open-jet proportioner with liquid from the reservoir controls the micro-diaphragm pump into the pumping mode and the open-jet proportioner into the non-operative state.

3. The system according to claim 1 ~~or 2~~ wherein the proportioning control controls the micro-diaphragm pump into the pumping mode with a reversal of direction and the open-jet proportioner into the non-operative position for filling the open-jet proportioner, the micro-diaphragm pump, and the reservoir at least partially with liquid through the proportioning port.

4. The system according to claim 1 ~~to 3~~ wherein the proportioning control controls the micro-diaphragm pump into the non-operative state for delivery of liquid from the proportioning port in an open jet.

5. The system according to claim 4 wherein the proportioning control controls the micro-diaphragm pump into the non-operative state for delivery in an open jet.

6. The system according to claim 4 ~~or 5~~ wherein the proportioning control controls the volume being proportioned for delivery in an open jet via the displacement volume of the open-jet proportioner.

7. The system according to any of claims 4 to 6 wherein the proportioning control controls the volume being proportioned for delivery in an open jet via the stroke volume or stroke volumes of the micro-diaphragm pump in filling the open-jet proportioner.

8. The system according to ~~any of claims~~ claim 1 ~~to 7~~ wherein the proportioning control controls the micro-diaphragm pump into the pumping mode and the open-jet proportioner in the non-operative position for draining the liquid out of the proportioning port.

9. The system according to ~~any of claims~~ claim 1 ~~to 7~~ wherein the proportioning control controls the volume being proportioned of the liquid being drained via the stroke volume or stroke volumes of the micro-diaphragm pump.

10. The system according to ~~any of claims~~ claim 1 ~~to 9~~ wherein the proportioning control controls the displacement of an auxiliary liquid column from the reservoir for the suction of liquid via the proportioning port or for the expulsion of liquid from the proportioning port by controlling the micro-diaphragm pump into the pumping mode in the one or the other direction, and the open-jet proportioner into the non-operative position.

11. The system according to claim 10 wherein the proportioning control controls the volume being proportioned of the liquid being drawn in or expelled via the stroke volume or stroke volumes of the micro-diaphragm pump.

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12. The system according to ~~any of claims~~ claim 1 ~~to 11~~ wherein the components micro-diaphragm pump and/or open-jet proportioner and/or reservoir and/or proportioning control are combined to form one constructional element in a microsystem technology or hybrid technology.

13. A microproportioning system including

- a compressible reservoir from which liquid is adapted to be **filled** by compression into
- an open-jet proportioner the entrance of which is connected to the reservoir,
- a proportioning port connected to the exit of the open-jet proportioner, and
- a proportioning control which is in an operative communication with the micro-open-jet proportioner.

14. The system according to claim 13 wherein the reservoir has at least one movable wall accessible from outside for compression.

15. The system according to claim 13 ~~or 14~~ wherein a movable wall of the reservoir is a slug adapted to sealingly slide in a portion of the reservoir connecting it to the atmosphere or is a diaphragm closing the reservoir or a pouch defining the reservoir.

16. The system according to ~~any of claims~~ claim 13 ~~to 15~~ wherein a microvalve designed as a non-return valve is disposed between the reservoir and the open-jet proportioner, which allows liquid to pass from the reservoir into the open-jet proportioner and blocks the passage of liquid in an inverse direction.

29
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17. The system according to ~~any of claims~~ 13 ~~to 15~~ wherein an active microvalve is disposed between the reservoir and the open-jet proportioner, which is in an operative communication with the proportioning control and is activated by it for filling the open-jet proportioner and is controlled into the blocked state for delivery in an open jet.

18. The system according to claim 17 wherein a filling-level sensor is disposed in the open-jet proportioner, which is in an operative communication with the proportioning control which controls a closure of the microvalve in filling the open-jet proportioner as soon as the filling-level sensor detects the liquid level.

19. The system according to ~~any of claims~~ 13 ~~to 18~~ wherein the proportioning control controls the volume being proportioned via the displacement volume of the open-jet proportioner.

20. The system according to ~~any of claims~~ 13 ~~to 19~~ wherein the components reservoir and/or open-jet proportioner and/or microvalve and/or filling-level sensor are combined to form one constructional element in a microsystem technology or hybrid technology.

21. A microproportioning system including

- a single reservoir,
- an open-jet proportioner the pressure chamber of which is the aforementioned reservoir, which
- is opened towards a proportioning port, and
- a proportioning control which is in an operative communication with the open-jet proportioner.

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22. The system according to claim 21 wherein the proportioning control controls the volume being proportioned of the liquid to be dispensed by the open-jet proportioner via the displacement volume of the open-jet proportioner.

23. The system according to claim 22 wherein the proportioning control controls the displacement volume of the open-jet proportioner by several steps for delivery of several volumes being proportioned.

24. The system according to ~~any of claims~~ claim 21 to ~~23~~ wherein the components open-jet proportioner and proportioning control are combined to form a constructional element in a microsystem technology or hybrid technology.

25. A microproportioning system including

- a reservoir
- a micro-diaphragm pump the entrance of which is connected to the reservoir,
- a proportioning port connected to the exit of the micro-diaphragm pump, and
- a proportioning control which is in an operative communication with the micro-diaphragm pump,
- wherein the micro-diaphragm pump and the reservoir are combined to form one constructional element exchangeably connected to an actuator module in a microsystem technology or hybrid technology.

26. The system according to claim 25 where the proportioning control controls the volume being proportioned via the stroke volume of the micro-diaphragm pump.

27. The system according to claim 25 ~~or 26~~ where the proportioning control is connected to a sensor for detection of the meniscus of the liquid at the beginning of

a displacement length of the liquid for adjustment of an initial position for the displacement of the liquid column.

28. The system according to claim 27 wherein the sensor is associated with a dispensing tube for the liquid.

29. The system according to ~~any of claims~~ 25 ~~to 28~~ wherein the dispensing tube is connected to the constructional element.

30. The system according to ~~any of claims~~ 25 to ~~29~~ wherein the constructional element is exchangeably connected to the base region of an actuator module.

31. The system according to ~~any of claims~~ 25 to ~~30~~ wherein the proportioning control is permanently connected to the actuator module and the constructional element is separably connected to the proportioning control via electric contact.

32. The system according to ~~any of claims~~ 25 ~~to 31~~ wherein the sensor is permanently connected to the actuator module.

33. The system according to ~~any of claims~~ 25 ~~to 32~~ wherein the proportioning control, the display and/or the operating means are accomodated on a joint printed-circuit board.

34. The system according to claim 33 wherein the printed-circuit board is disposed in the middle region of the actuator module.

35. The system according to ~~any of claims~~ 25 ~~to 34~~ wherein the power supply is accomodated in the head region of the actuator module.

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36. A microproportioning system including

- a reservoir,
- a micro-diaphragm pump the entrance of which is connected to the reservoir,
- a proportioning port connected to the exit of the micro-diaphragm pump, and
- a proportioning control which is in an operative communication with the micro-diaphragm pump, which controls the displacement of an auxiliary liquid column from the reservoir for suction of liquid through the proportioning port or an expulsion of liquid from the proportioning port by controlling the micro-diaphragm pump into the pumping mode in the one or the other direction.

37. The system according to claim 36 wherein the proportioning control controls the volume being proportioned via the stroke volume of the micro-diaphragm pump.

38. The system according to claim 36 or 37 wherein the proportioning control is connected to a sensor for detection of the meniscus of the liquid at the beginning of a displacement length of the liquid for adjustment of an initial position for displacement of the liquid column.

39. The system according to claim 36 to 38 wherein the proportioning control determines the volume being proportioned on the basis of a calibration of the stroke volume that it establishes by displacing the auxiliary liquid column by means of the micro-diaphragm pump along a calibration length between sensors which are in an operative connection therewith for detection of the meniscus of the auxiliary liquid column.

40. The system according to claim ~~any of claims~~ 36 ~~to 39~~ wherein the proportioning control controls the volume being proportioned by displacing the auxiliary liquid by means of the micro-diaphragm pump along the spacing adjustable manually or by means of a mechanical drive between two sensors sensors which are in an operative communication therewith for detection of the meniscus of the auxiliary liquid on a displacement length and the spacing of the sensors corresponds to the volume being proportioned.

41. The system according to claim 40 wherein the displacement means has a screw including a servo-drive and a screw nut and a sensor mounted on the screw.

42. The system according to claim ~~any of claims~~ 36 ~~to 41~~ wherein the components micro-diaphragm pump and/or reservoir and/or proportioning control are combined to form a constructional element in a microsystem technology or hybrid technology.

43. A microproportioning system including

- a reservoir having a capillary balance system,
- an open-jet proportioner the entrance of which is connected to the capillary balance system,
- a proportioning port connected to the exit of the open-jet proportioner, and
- a proportioning control which is in an operative communication with the open-jet proportioner.

44. The system of claim 43 wherein the capillary balance system has at least one meander-shaped or spiralled capillary.

45. The system of claim 43 ~~or 44~~ wherein the capillary balance system is closed, towards a filling and/or deaeration port, by slug which is adaped to migrate along with a liquid filled into the capillary balance system.

46. The system according to ~~any of claims~~ claim 43 ~~to 45~~ wherein the capillary balance system is defined by a duct system in a panel-shaped body.

47. The system according to claim 46 wherein the panel-shaped body has a cover plate locking the duct system.

48. The system according to claims 46 or 47 wherein the capillary balance system has a passage extending across the panel-shaped body and intersecting the duct system for connection with the open-jet proportioner.

49. The system according to ~~any of claims~~ claim 43 ~~to 48~~ wherein the capillary balance system has a wound-up capillary.

50. The system according to ~~any of claims~~ claim 43 ~~to 49~~ wherein a microvalve formed as a non-return valve is disposed between the reservoir and the open-jet proportioner, which allows liquid to pass from the reservoir to the open-jet proportioner and blocks the passage of liquid in an inverse direction.

51. The system according to ~~any of claims~~ claim 43 ~~to 49~~ wherein an active microvalve is disposed between the reservoir and the open-jet proportioner, which is in an operative connection with the proportioning control and is activated thereby for filling the open-jet proportioner and is controlled into the blocked state for the delivery of an open jet.

52. The system according to claim 51 wherein a filling-level sensor is disposed in the open-jet proportioner, which is in an operative communication with the proportioning control which controls the closure of the microvalve in filling the open-jet proportioner as soon as the filling-level sensor detects the liquid level.

53. The system according to ~~any of claims~~ claim 43 ~~to 52~~ wherein the proportioning control controls the volume being proportioned via the displacement volume of the open-jet means.

54. The system according to ~~any of claims~~ claim 43 ~~to 53~~ wherein the reservoir and/or the open-jet proportioner and/or the proportioning control are combined to form a constructional element in a microsystem technology or hybrid technology.

55. The system according to ~~any of claims~~ claim 43 ~~to 54~~ wherein the reservoir is made of plastic and is mounted on a constructional element based on a microsystem technology which comprises the open-jet proportioner.

56. The system according to claim 55 wherein the reservoir has a snap connection with the constructional element.

57. The system according to ~~any of claims~~ claim 43 ~~to 56~~ wherein the reservoir with a socket is pressed against a sealing seat of the open-jet proportioner that has an entrance.

58. The system according to ~~any of claims~~ claim 55 ~~to 57~~ wherein the reservoir has a projection extending beyond the constructional element and is connected to an actuator module on the projection.

59. The system according to claim 58 wherein the constructional element with the open-jet proportioner bears with no clearance against an actor permanently connected to the actuator module, for the open-jet proportioner.

60. A microproportioning system including

- a reservoir in plastic,
- a substantially panel-shaped delivering means designed as a constructional element in a microsystem technology including a micro-diaphragm pump and/or an open-jet proportioner wherein the reservoir and the constructional element are fixed to each other in an overlaying relationship and the entrance of the delivering device is connected to the reservoir,
- a proportioning port connected to the exit of the delivering means, and
- a proportioning control which is in an operative communication with the delivering means.

61. The system according to claim 60 wherein the reservoir has a snap connection with the constructional element.

62. The system according to claim 60 ~~or 61~~ wherein the reservoir with a socket is pressed against a sealing seat of the delivering means that has an entrance.

63. The system according to ~~any of claims~~ claim 60 ~~to 62~~ wherein the reservoir has a projection extending beyond the constructional element in a microsystem technology and is connected to an actuator module on the projecting member.

64. The system according to ~~any of claims~~ claim 60 to ~~63~~ wherein the micro-diaphragm pump and/or the open-jet proportioner bears with no clearance against an actor permanently joined to the actuator module.

65. The system according to ~~any of claims~~ claim 60 ~~to 64~~ wherein the reservoir is disposed above the delivering means with the proportioning port vertically aligned downwards.

66. The system according to ~~any of claims~~ claim 60 ~~to 65~~ wherein the reservoir is compressible.

67. A microproportioning system including

- a reservoir,
- a delivering means including a micro- diaphragm pump and/or an open-jet proportioner the entrance of which is connected to the reservoir,
- a proportioning port connected to the exit of the delivering means,
- a proportioning control which is in an operative communication with the delivering means,
- an actuator module to which the constructional element comprising the reservoir is exchangeably connected, and
- a temperable carrier into which the constructional element removed from the actuator module is adapted to be inserted.

68. The system according to claim 67 wherein the reservoir is filled with an enzyme.

69. The system according to claim 67 ~~or 68~~ wherein the carrier has one or more temperable seats for ~~one~~ or more constructional elements.

70. The system according to claim 69 wherein the cross-section of the seat is complementary to the cross-section of the constructional element.

71. The system according to ~~any of claims~~ claim 67 ~~to 70~~ wherein the carrier comprises a brine-filled cooling accumulator.

72. A microproportioning system including

- a reservoir,
- a delivering means including a micro- diaphragm pump and/or an open-jet proportioner the entrance of which is connected to the reservoir,
- a proportioning port connected to the exit of the delivering means,
- a proportioning control which is in an operative communication with the delivering means,
- wherein a constructional element comprising the reservoir and/or the delivering means is exchangeably connected to an actuator module and has a coding and the actuator module has a sensing device for coding the constructional element.

73. The system according to claim 72 wherein the coding relates to an information on a filling substance and/or one or more proportioning characteristics of the exchangeable constructional element.

74. The system according to claim 72 ~~or 73~~ wherein coding and sensing are mechanical, magnetic, inductive, optical and/or chemical.

75. The system according to claim 74 wherein the coding is constituted by recesses and/or projections of the constructional element and the sensing means senses the presence and/or the dimensions of the projections or recesses.

76. The system according to ~~any of claims~~ Claim 72 to ~~75~~ wherein the sensing means is connected to an evaluation means and/or an indicator means and/or a storing means and/or a control means.

77. A microproportioning system including
- a reservoir,
- a delivering means including an open-jet proportioner or, if need be, a micro-diaphragm pump, the entrance of the delivering means being connected to the reservoir,
- a proportioning port connected to the exit of the delivering means,
- a proportioning control which is in an operative communication with the delivering means, and
- a light source for a light beam the emission axis of which is aligned with respect to the proportioning port such that the light beam marks the axis of motion and/or the point of impingement of the liquid dispensed from the proportioning port.

78. The system according to claim 77 wherein the light source is a laser diode.

79. The system according to claim 77 ~~or 78~~ wherein the axis of emission is aligned parallel to the axis of the proportioning port and runs thereon or directly at the side thereof.

80. The system according to claim 77 to ~~79~~ wherein the axis of emission is aligned at an acute angle to the axis of the proportioning port and intersects it approximately at the point of impingement of the liquid.

81. The system according to ~~any of claims~~ 77 ~~to 80~~ wherein the light source has a focussing point of the light beam approximately at the point of impingement of the liquid.

82. The system according to claim 80 ~~or 81~~ wherein there are several light sources having axes of emission intersecting each other at the point of impingement of the liquid.

83. The system according to ~~any of claims~~ 77 ~~to 82~~ wherein an alignment of the light beam is effected via optical guides and/or via an optical guide structure integrated in a constructional element in a microsystem technolgy.

84. The system according to ~~any of claims~~ 1 to 83 wherein the reservoir is precharged with liquid.

85. The system according to ~~any of claims~~ 1 ~~to 84~~ wherein the reservoir has a capillary balance system.

86. The system according to ~~any of claims~~ 1 ~~to 85~~ wherein the proportioning port is of a nozzle shape.

87. The system according to ~~any of claims~~ 1 ~~to 86~~ wherein the proportioning port is formed at an exchangeable pipette tip.

88. The system according to ~~any of claims~~ 1 ~~to 87~~ wherein a constructional element is exchangeably connected to an actuator module.

89. The system according to claim 1 wherein the reservoir is connected to the entrance of the open-jet proportioner via a feeding capillary.

90. The system according to claim 1 wherein there is a cooling means and/or heat insulation for the liquid, especially in the reservoir.

91. The system according to claim 1 wherein there is a heating means for the liquid, especially in the micro-diaphragm pump, the open-jet proportioner and/or the connecting lines.

92. The system according to claim 1 wherein there is a mechanical or fluid-based closure between the reservoir and the proportioning port.

93. The system according to claim 1 wherein the proportioning control has a microcontroller.

94. The system according to claim 1 which is designed with several ducts having a joint reservoir or several reservoirs.

95. The system according to claim 1 which is designed as a portable unit.